

Date: Wednesday, 5/2/2007 3:48:32 PM  
 User: Kim Johnston

## Process Sheet

Customer	: CU-DAR001 Dart Helicopters Services	Drawing Name	: 212/205 HIGH AFT X-TUBE ASSEMBLY
Job Number	: 32149		
Estimate Number	: 10257		
P.O. Number	: N/A	Part Number	: D212664201
This Issue	: 5/2/2007	S.O. No.	: N/A
Prsht Rev.	: NC	Drawing Number	: D212-664-241 REV C
First Issue	: N/A	Project Number	: N/A
Previous Run	: 32148	Drawing Revision	: C
		Material	: N/A
		Due Date	: 5/30/2007
Written By	:	Qty:	1 Um: Each
Checked & Approved By	:		
Comment	:		

Est Rev: E 04-02-16 Reformat K/DS  
 Est Rev: F 06-03-29 Remove Comments on Pick List JLM  
 Est Rev: G 07-04-30 As per Rev C JLM

## Additional Product

Job Number:



Seq. #:	Machine Or Operation:	Description :
---------	-----------------------	---------------

1.0	DC	DOCUMENT CONTROL
-----	----	------------------



Comment: DOCUMENT CONTROL

Photocopy bluefile and create labels as per PPP D212-664-201CHG003

KS 07-05-10 ① JF 07/05/05

2.0	D6006129	Crosstube material
-----	----------	--------------------



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

Pick:

Qty Part number Description Batch

1 D6006-129 Crosstube B29112

Check OD = 3.250"; ID = 2.220"

JF 07/05/05

3.0	MORI SEIKI	MORI SEIKI CNC LATHE LARGE
-----	------------	----------------------------



Comment: MORI SEIKI CNC LATHE LARGE

1-Fill tube with sand &amp; install plugs DT8534 on both ends as per Folio FA114

2-Turn first side as per Folio FA114

3-Deburr &amp; Inspect for surface damage. Repair damage within limits as per Dwg D212-664-241.

JF 07/05/05

4.0	QC1	INSPECT ALL DIM TO DIM SHEET
-----	-----	------------------------------



Comment: INSPECT ALL DIM TO DIM SHEET

JF 07/05/10

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

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Job Number:



Seq. #:

Machine Or Operation:

Description :

5.0

MORI SEIKI

MORI SEIKI CNC LATHE LARGE



Comment: MORI SEIKI CNC LATHE LARGE

1-Turn second side as per Folio FA114

2-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D212-664-241.

25 07/05/10

6.0

QC1

INSPECT ALL DIM TO DIM SHEET



Comment: INSPECT ALL DIM TO DIM SHEET

25 07/05/10

7.0

QC8

SECOND CHECK



Comment: SECOND CHECK

25 07/05/10

8.0

MORI SEIKI

MORI SEIKI CNC LATHE LARGE



Comment: MORI SEIKI CNC LATHE LARGE

1-Remove sand and plugs

2-Scribe part # and batch # using vibrating stylus as per Dwg D212-664-241

25 07/05/10

9.0

LANDING GEAR 1

LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Polish entire outside surface of crosstube

25 7-5-10

10.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

DP 2-5-10

11.0

HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat as per QSI 005 4.1 within 24 hours of machining

25 7-5-10

W/O:		WORK ORDER CHANGES					
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Drawing Name: 212/205 HIGH AFT X-TUBE ASSEMBLY

Job Number: 32149

Part Number: D212664201

Job Number:



Seq. #:

Machine Or Operation:

Description :

12.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

LP 7-5-28

13.0

BENDING

BENDING MACHINE



Comment: BENDING MACHINE

Bend tube as per Dwg D212-664-241 using CNC bender program 212-af and Folio FT007

EL 7-5-28

14.0

QC15

DIMENSIONAL CHECK OF X-TUBES



Comment: DIMENSIONAL CHECK OF X-TUBES

406.04 (1)

15.0

LANDING GEAR 1

LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Drill pilot holes in tube as per Dwg D212-664-241 using drill Jig DT8550 & DT8551

2-Ream hole to finish size in tube as per Dwg D212-664-241 using drill Jig DT8550 & DT8551. Check dimensions between holes, both sides on both cuffs, to ensure alignment with saddle holes.

3-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D212-664-241

7-6-18  
EL

16.0

HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat as per QSI 005 4.1 within 24 hours of bending and drilling

7-6-19

17.0

QC3

INSPECT POWDER COAT/CHEMICAL CONVERSION



Comment: INSPECT POWDER COAT/CHEMICAL CONVERSION

207-06-20 (1)

18.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

207-06-20 (1)

19.0

OUTSIDE SERV.10

OUTSIDE SERVICES -LG



Comment: Sub-Contracting OUTSIDE SERVICES

Liquid Penetrant Inspection as per QSI 038

Issue P/O: 4012

LPI as per ASTM 1417 Level 2

207/06/21 (1)

# Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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Job Number: 32149

Part Number: D212664201

Job Number:



Seq. #:

Machine Or Operation:

Description :

Attach copy of NDT results to work order

20.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Inspect for transit damage Ensure copy of NDT results attached to work order.

*07/06/26 @*

21.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: DIMENSIONAL CHECK

Inspect for damage & ensure results are as per Dwg D212-664-241

*En 07/06/27 X1*

22.0

SPRAY PAINTING

SPRAY PAINTING



Comment: SPRAY PAINTING

1-Prime inside and outside crosstube as per QSI 005 4.2

2-Paint outside crosstube with White Imron as per QSI 005 4.2

*2 per Ian Titley 07-07-26  
} AT 07-07-20*

23.0

QC14

INSPECT SPRAY PAINT



Comment: Inspect Spray Paint

Then, Wrap in plastic bag to protect from scratches

*ml 07 07 21*

*(1)*

24.0

D29401

Support



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Pick:

Qty Part number Description Batch

2 D2940-1

Support

*29707*

*ml 07 07 21*

25.0

D3595

Rubber Cushion (per sq ft)



Comment: Qty.: 0.0242 sf(s)/Unit Total : 0.0242 sf(s)

Rubber Cushion (per sq ft)

.63" x 5.300

Batch:

*33542*

*ml 07 07 23*

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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Job Number: 32149

Part Number: D212664201

Job Number:



Seq. #:

Machine Or Operation:

Description :

26.0

MS2192028

Clamp(per MIL-DTL-8783C)



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)

Pick:

Qty Part number Description Batch

4 MS21920-28

Clamp

103896

ml 07 07 21

27.0

LANDING GEAR 1

LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Install supports with magnobond as per QSI 015 Adhere for for 12 Hrs

A/R 6398 Magnobond

Batch: 104723

Expiry Date: 04/2008

ml 07 07 21

2-Install clamps as per Dwg D212-664-241. Torque clamps to 80-100 in lb.

28.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

En 07/07/24 (21)

29.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Pick Packing Kit

30.0

D34281

Placard



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

Placard

Batch: B26249 ✓

EP

31.0

AN640A

Bolt



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)

Bolt

Batch: M103177 ✓

EP

EP 07/07/24

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes ☒ No ☐ DQA:   D   Date:   9/18/02  

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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Job Number: 32149

Part Number: D212664201

Job Number:



Seq. #:

Machine Or Operation:

Description :

32.0

AN641A

Bolt



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)  
Bolt  
Batch: M100743 ✓

EP

33.0

AN960JD616

Washer



Comment: Qty.: 18.0000 Each(s)/Unit Total : 18.0000 Each(s)  
Washer  
Batch: M103641 ✓

EP

34.0

MS21042L6

Nut



Comment: Qty.: 6.0000 Each(s)/Unit Total : 6.0000 Each(s)  
Nut  
Batch: M101660 ✓

EP

35.0

QC4

INSPECT 100% KITS FOR COMPLETENESS



Comment: INSPECT 100% KITS FOR COMPLETENESS

EP 07/07/05

07/07/25 ①

36.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1  
Identify and pack for shipping as per PPP D212-664-201

REV: C

EP 07/07/25 ①

37.0

QC21

FINAL INSPECTION/W/O RELEASE



Comment: FINAL INSPECTION/W/O RELEASE

07/08/02 ①

Job Completion



u 07/07/25

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

<b>DART AEROSPACE LTD</b>		<b>Work Order:</b>	32149
<b>Description:</b> Crosstube Assembly (205/212 High Aft)		<b>Part Number:</b>	D212-664-241
<b>Inspection Dwg:</b> D212-664-241 <b>Rev:</b> B/C PH 07-05-02		<b>Page 1 of 1</b>	

### FIRST ARTICLE INSPECTION CHECKLIST

☒ First Article ☐ Prototype

	Inspection Sheet Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	0.200	+/-0.010	2.00	/			
	R0.063	+/-0.010	.063	/			
	2.990	+0.005/-0.000	2.994	/			
	5.237	+/-0.030	5.237	/			
	2.600	+0.005/-0.000	2.604	/			
	2.686	+0.005/-0.000	2.690	/			
	2.770	+0.005/-0.000	2.774	/			
	2.854	+0.005/-0.000	2.858	/			
	2.938	+0.005/-0.000	2.942	/			
	3.021	+0.005/-0.000	3.025	/			
	3.133	+0.005/-0.000	3.137	/			
	3.179	+0.005/-0.000	3.183	/			
SIDE B	0.200	+/-0.010	2.00	/			
	R0.063	+/-0.010	.063	/			
	2.990	+0.005/-0.000	2.994	/			
	5.237	+/-0.030	5.237	/			
	2.600	+0.005/-0.000	2.604	/			
	2.686	+0.005/-0.000	2.690	/			
	2.770	+0.005/-0.000	2.774	/			
	2.854	+0.005/-0.000	2.858	/			
	2.938	+0.005/-0.000	2.942	/			
	3.021	+0.005/-0.000	3.025	/			
	3.133	+0.005/-0.000	3.137	/			
	3.179	+0.005/-0.000	3.183	/			
	124.36	+/-0.020	124.36				

<b>Measured by:</b> S	<b>Audited by:</b> En	<b>Prototype Approval:</b>	N/A
<b>Date:</b> 07/05/10	<b>Date:</b> 07/05/10	<b>Date:</b>	N/A

Rev	Date	Change	Revised by	Approved
A	05.04.27	New Issue (P/O D412-664-201)	KJ/JLM	
B	06.03.09	Tolerance for 5.237 was +/-0.001	KJ/JLM	

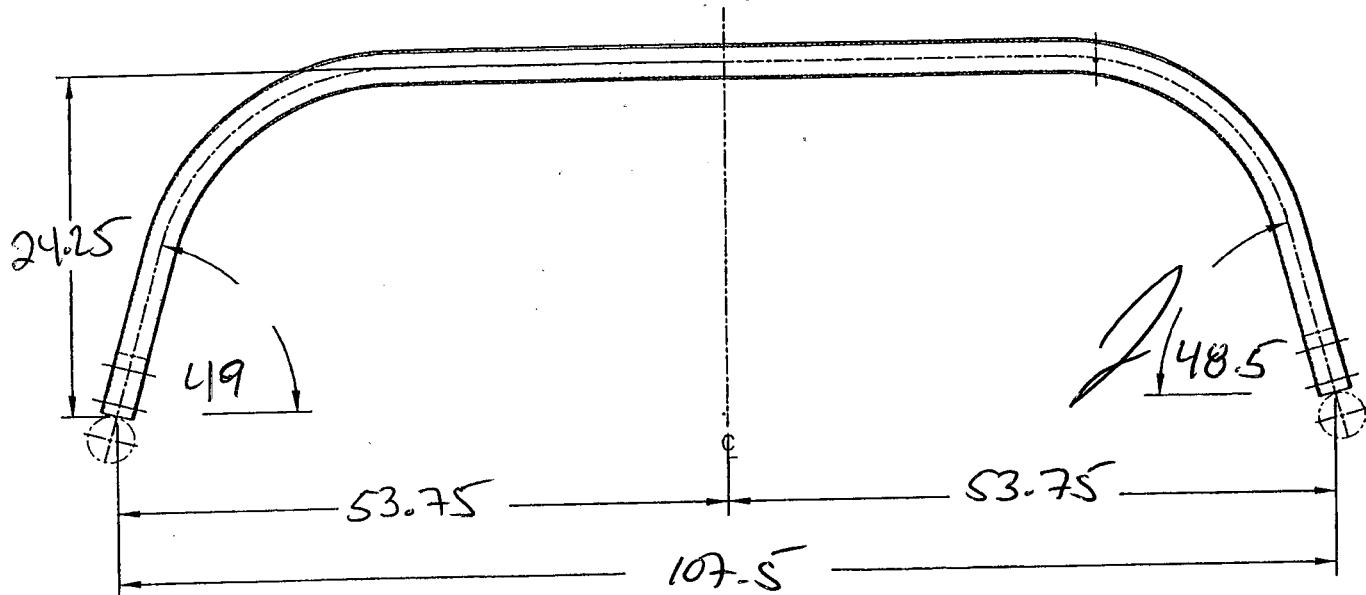
DART AEROSPACE LTD		Work Order:	32149
Description: Crosstube High Aft (205/212)		Part Number:	D212-664-201
Inspection Dwg: D212-664-241 Rev: <del>B C</del> PH 07.05.02		Page 1 of 1	

Required Dimension	Min	Max
Height	24.17 24.24	24.30 24.43
1/2 Span	53.59 53.66	53.78 53.85
Angle	49	52
Total Span	107.32	107.56

107.13

107.70

PH 07.05.02



Comments

QC15 Inspection	
Date	0706-04

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	

**DART**

DESIGN <i>PH</i>	DRAWN BY <i>PH</i>	<b>DART AEROSPACE LTD</b> HAWKESBURY, ONTARIO, CANADA	
CHECKED <i>[Signature]</i>	APPROVED <i>[Signature]</i>	DRAWING NO. D212-664-241	REV. C SHEET 1 OF 3
DATE 07.03.08		TITLE CROSSTUBE ASS'Y (205/212 HI AFT) NTS	
A	00.12.12	NEW ISSUE	
B	05.02.04	ADD HOLES FOR COMPATABILITY WITH BHT/AA SKIDTUBES	
C	07.03.08	REMOVE -1009 ABRASION STRIP; ADD MAGNOBOND 6398, CUSHION, REVERSE CLAMPS	

**RELEASED**  
*07.04.24 P*  
PER E.C.N 289

Qty	Part Number	Description
X	D212-664-241	CROSSTUBE ASSEMBLY (205/212 HIGH AFT)
1	D6006-129	CROSSTUBE
2	D2940-1	SUPPORT
4	D3595-063-530	RUBBER CUSHION
4	MS21920-28	CLAMP (OR MS21920-30)
A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947- 100, TYPE II, CLASS 2 ADHESIVE)

**GENERAL NOTES:**

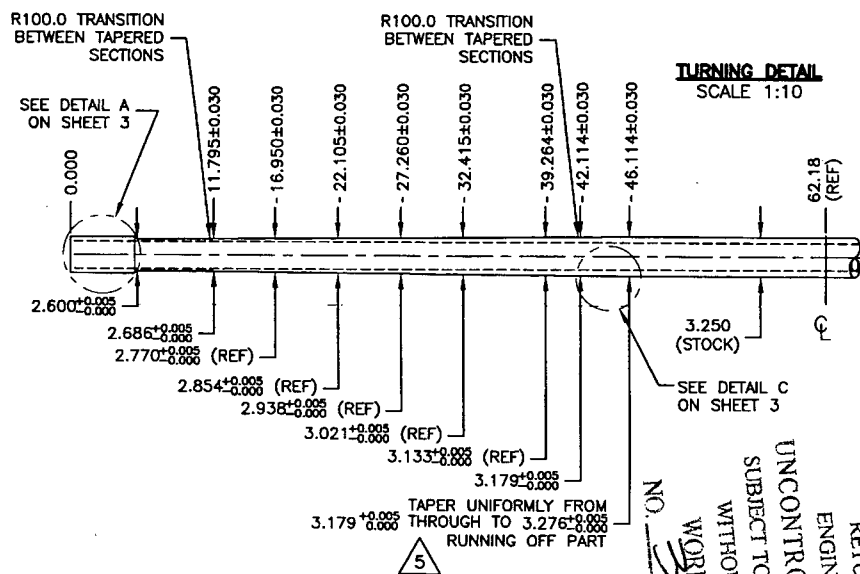
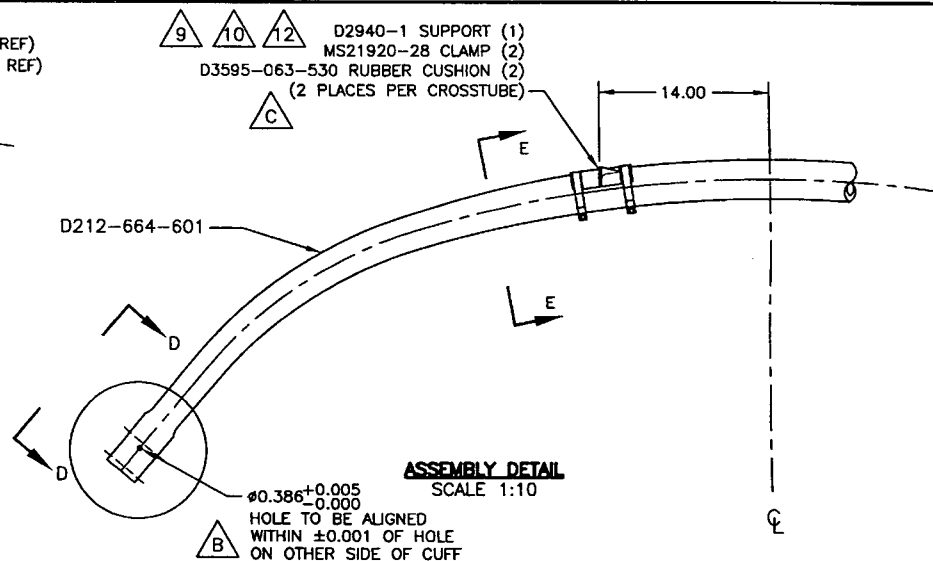
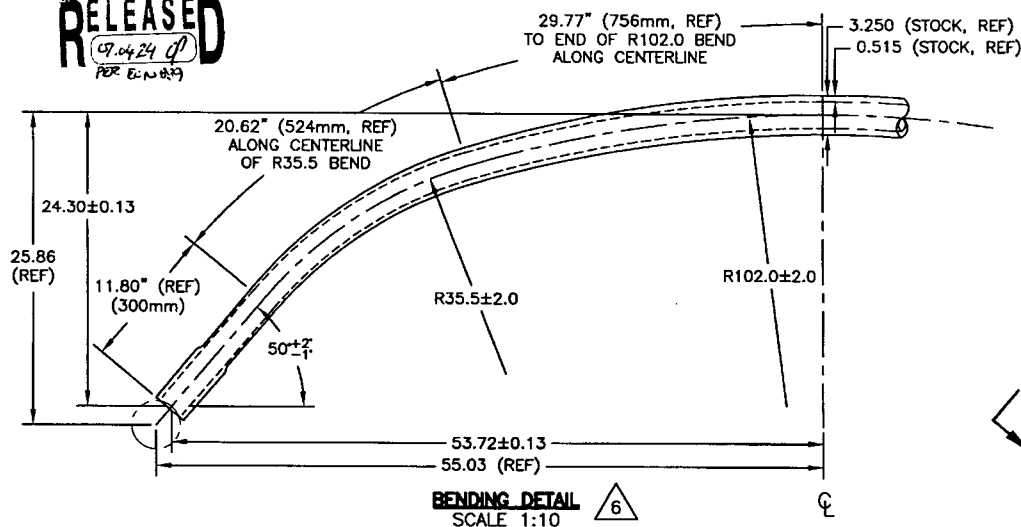
- 1) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED
- 2) MATERIAL: MANUFACTURED FROM D6006-129  
FINISHED LENGTH = 124.36±0.020
- 3) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- 4) PART IS SYMMETRIC ABOUT CENTERLINE
- 5) RUN-OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
- 6) BEND PROGRESSIVELY WITH A MINIMUM OF 5 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 7) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 8) SCRIBE DART PART NUMBER AND BATCH NUMBER IN THIS AREA WITH VIBRATING STYLUS.
- 9) INSTALL D2940-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 10) INSTALL MS21920-28 CLAMPS WITH D3595-063-530 RUBBER CUSHIONS TO SECURE D2940-1 SUPPORT ON TOP SIDE OF CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE OF CROSSTUBE SUPPORT  
**NOTE:** MS21920-30 CLAMPS CAN BE USED TO ACCOMMODATE VARYING DIAMETERS. ENSURE THERE IS A MINIMUM OF 1.5 THREADS IN SAFETY ON THE NUTS.
- 11) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 12) TORQUE CLAMPS 80 TO 100 IN-LB.

SHOP COPY  
RETURN TO  
ENGINEERING  
UNCONTROLLED COPY  
SUBJECT TO AMENDMENT  
WITHOUT NOTICE  
WORK ORDER  
NO. *32149*

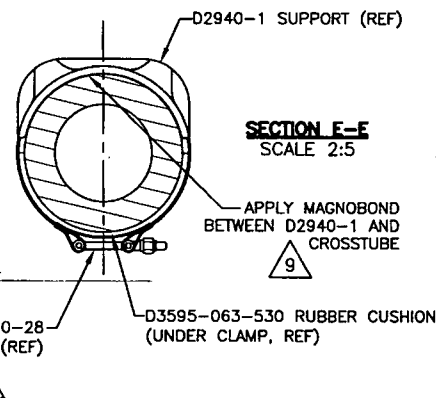
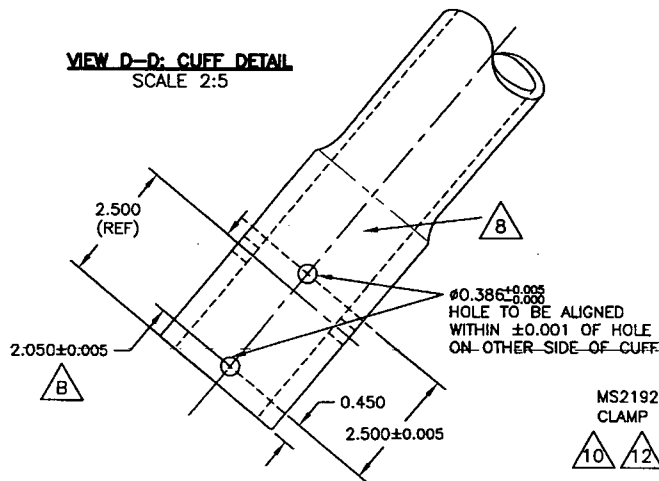
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**RELEASED**  
 07.04.24  
 PER E-N 013



**VIEW D-D: CUFF DETAIL**  
 SCALE 2:5



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DESIGN PH

DRAWN BY PH

**DART**

**DART AEROSPACE LTD.**  
 MARKHAM, ONTARIO, CANADA

CHECKED

APPROVED

DRAWING NO.  
 D212-664-241

REV. C  
 SHEET 2 OF 3

DATE

TITLE

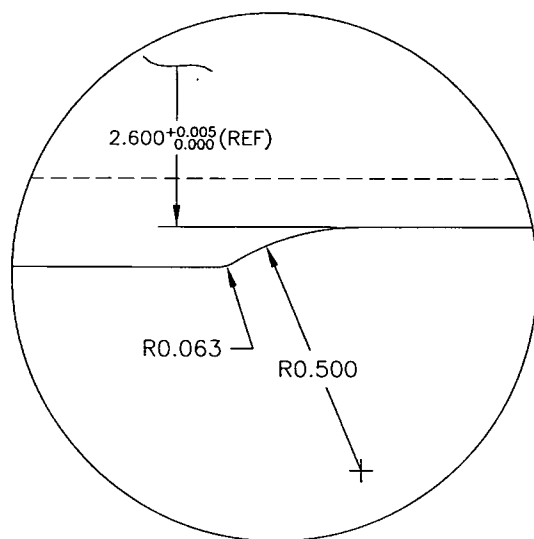
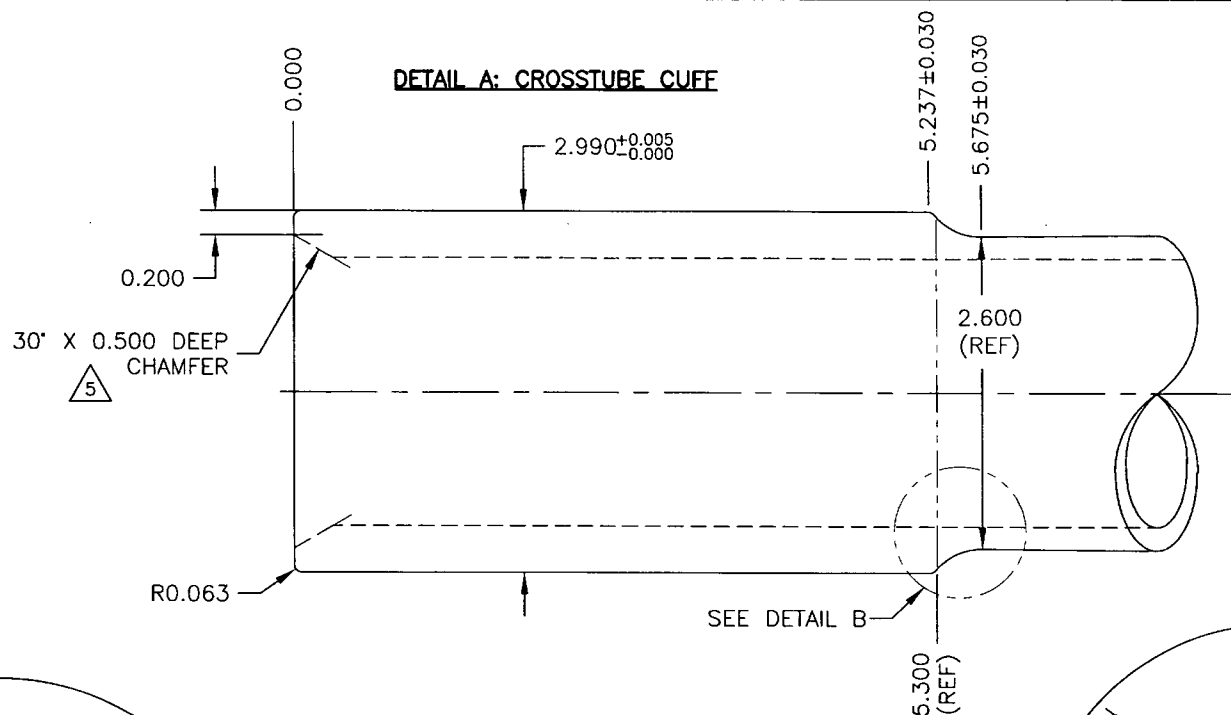
CROSSTUBE ASS'Y (205/212 HI AFT) SCALE 1:10

NO. 30149  
 WORK ORDER  
 UNCONTROLLED COPY  
 SUBJECT TO AMENDMENT  
 WITHOUT NOTICE  
 RETURN TO  
 ENGINEERING  
 SHOP COPY



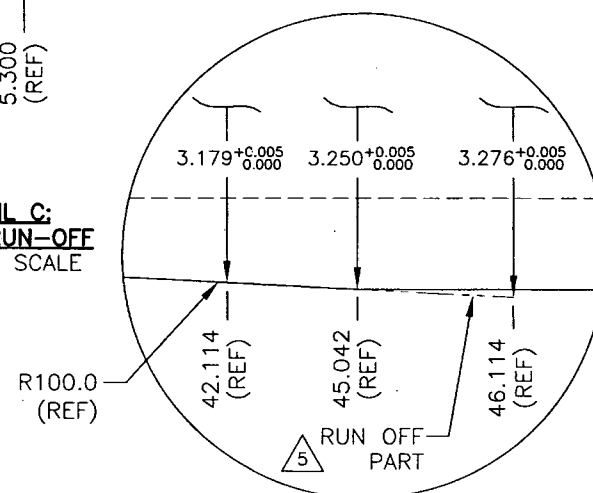
**RELEASED**  
 070424  
 1000 0000

**DETAIL A: CROSSTUBE CUFF**



**DETAIL B: CUFF  
 TRANSITION**  
 SCALE 4:1

**DETAIL C:  
 TAPER RUN-OFF**  
 NOT TO SCALE



NO. 321749  
 WORK ORDER  
 WITHOUT NOTICE  
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 RETURN TO  
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DESIGN

DRAWN BY

**DART**

**DART AEROSPACE LTD.**  
 HAWKESBURY, ONTARIO, CANADA

CHECKED

APPROVED

DRAWING NO.  
 D212-664-241

REV. C  
 SHEET 3 OF 3

DATE

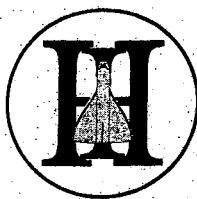
TITLE

SCALE

07.03.08

CROSSTUBE ASS'Y (205/212 HI AFT)

1:1



# HeathAir

INTERNATIONAL (1991) INC.

681 Ave. Lepine, Dorval, Québec H9P 1G3  
Tél.: (514) 636-1000 • Fax: (514) 636-0031

W.O. N° 36755

A.M.O. Number: 46/90

## NON-DESTRUCTIVE TESTING REPORT

### AIRCRAFT / COMPONENT INFORMATION

REGISTRATION:

MODEL/TYPE:

SERIAL NUMBER:

TOTAL HR/LDG:

OPERATED BY:

BASED AT:

### INSPECTION REQUIREMENTS

Carry out FPI of (16) cross tube (external surface) as per ASTM E-1417:05 and the Dart QSI 038, Section 4.1.1 (on file at client) - parts delivered to HeathAir.

Qty (3) P/N D206-667-201 S/N's B30318, B30442 & B30441

Qty (4) P/N D206-667-203BL S/N's B32672, B32458, B32671 & B32457

Qty (1) P/N D407-667-205 S/N B31040

Qty (1) P/N D206-667-201 S/N B30440

Qty (4) P/N D212-664-201 S/N's B32148, B32146, B32149 & B32147

Qty (3) P/N D206-667-103BL S/N's B32667, B32455 & B32456

☐ RADIOGRAPHY

☐ ULTRASONIC

☒ PENETRANT

☐ MAGNETIC PARTICLE

☐ EDDY CURRENT

### INSPECTION REPORT

Fluorescent penetrant inspection was performed in accordance with the above requirements on (16) cross tubes.

Note: A Level 3 penetrant was substituted for the requested Level 2 (3 is more sensitive)

Ardrox 970P25E Batch #04B503.

All (16) cross tubes passed inspection.

THE MAINTENANCE DESCRIBED ABOVE HAS BEEN PERFORMED IN ACCORDANCE WITH  
THE APPLICABLE STANDARDS OF AIRWORTHINESS

INSPECTED BY:

*S. FLECHER*  
S. FLECHER

DATE June 22, 2007

INSPECTION  
STAMP(S) Not Required

### CUSTOMER INFORMATION

CUSTOMER: Dart Aerospace

P.O. NUMBER

4012

ADDRESS:

CONTACT NAME:

Chantel

LABOUR

@

\$

MATERIALS

@

TRAVEL EXPENSES

@

GST

HOTEL EXPENSES

@

PST

INVOICE NO.

TOTAL \$

WHITE COPY - INSPECTION FILE • YELLOW COPY - CUSTOMER • PINK COPY - ACCOUNTANT